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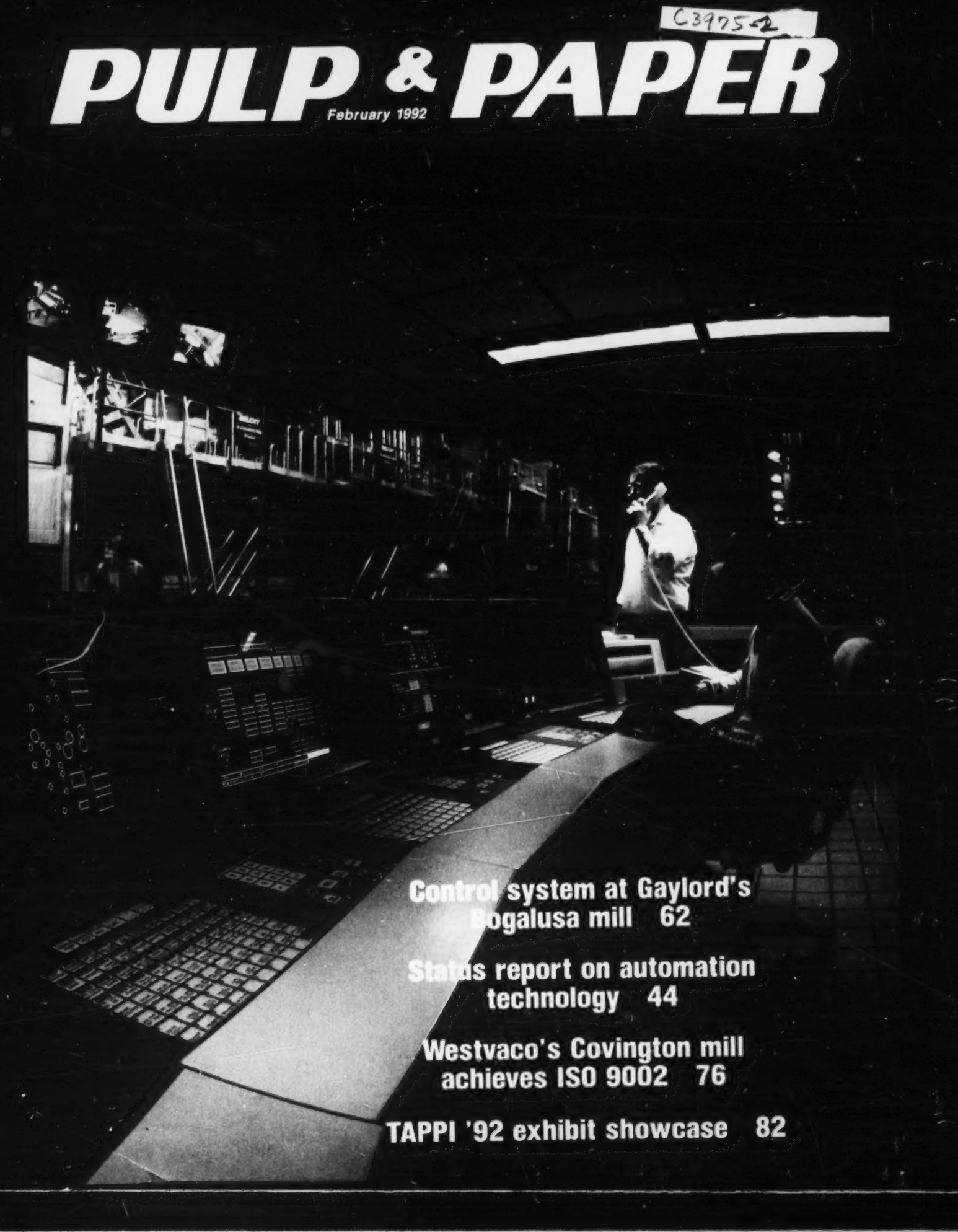
PULP & PAPER

February 1992



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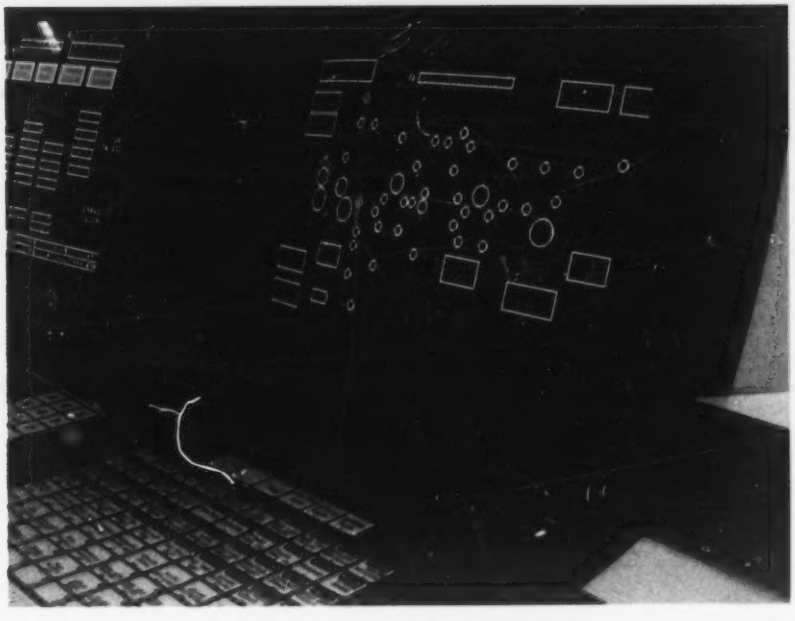

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THE COVER

This issue's focus on process automation includes a report on the single-window architecture for process control and information systems in use on Gaylord Container Corp.'s new No. 8 linerboard machine at Bogalusa, La. The cover photo shows the mill's operators inside the new control room on the No. 8 machine room floor. (Photo courtesy of Gaylord Container Corp. and Honeywell Inc.)

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European paper production slowing

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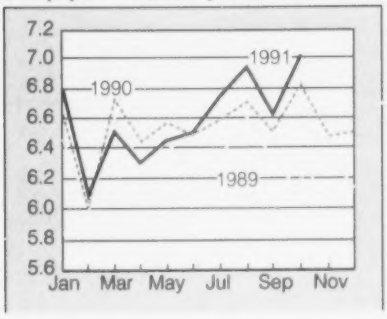
ABP

BPA

U.S. paper and board production



U.S. production of paper and paperboard totaled 7.0 million tons in October 1991, up 2.9% from the previous year, according to the American Paper Institute. The seasonally adjusted rate of production stood at 79.2 million tpy through the first ten months, up 0.7% from the same period in 1990. Paperboard production was up a seasonally adjusted 2.0% to a 40.0-million-tpy rate, while paper output was off 0.6% to 39.2 million tpy. Strong exports were responsible for the strong showing, which comes in the face of continued weakness in the domestic economy.

Among major grades, renewed strength in the printing and writing sector gave paper output a boost. Uncoated groundwood and free-sheet grades both set record monthly highs, although shipments for the year still lag year-earlier levels. Containerboard production for the domestic market was up 0.5% through October, but production for export posted a 19.5% increase. Fiber box shipments were up 1.9% for the month, keeping pace with 1990 for the year to date.

Canadian newsprint shipments totaled 735,000 metric tons in October, up 3.5% from a year earlier, while market pulp shipments rose 1.3% to 727,000 tons. Operating rates dropped to 79% at newsprint mills and 86% at pulp plants for the year through October. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Oct.	584	3.7	6,812	3.7
Uncoated groundwood (s)	Oct.	163	-3.0	1,790	-0.8
Coated paper (s)	Oct.	672	-2.5	7,345	-3.3
Uncoated free-sheet (s)	Oct.	1,081	7.1	11,631	0.6
Other printing/writing	Oct.	129	-5.1	1,485	-6.1
Total packaging and other paper (s)	Oct.	388	-5.6	4,483	-2.7
Tissue	Oct.	486	-4.1	5,697	-1.9
Total paper	**Oct.**	**3,505**	**0.6**	**39,242**	**-0.6**
Unbleached kraft paperboard	Oct.	1,823	3.9	20,829	2.9
Semichemical medium	Oct.	489	1.9	5,676	-0.2
Bleached paperboard	Oct.	376	8.7	4,586	3.5
Recycled paperboard	Oct.	834	9.2	9,099	0.6
Total paperboard	**Oct.**	**3,521**	**5.3**	**40,190**	**2.0**
Total U.S. paper and paperboard output	**Oct.**	**7,026**	**2.9**	**79,432**	**0.7**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Oct.	5,458	5.0	63,771	1.2
Market pulp production	Oct.	776	5.7	9,029	1.8
Wastepaper consumption at paper/board mills	Oct.	1,935	8.4	21,810	3.6
Pulpwood consumption (cords)	Sept.	7,871	-4.5	98,636	-0.6
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Oct.	31.334	1.9	271.378[6]	0.0
Containerboard inventories at U.S. box plants and mills	Sept. 30	2,539	-1.2		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Sept.	967	-2.1	11,996	-8.2
Imports of Canadian newsprint	Sept.	571	-1.4	7,446[6]	-9.6
U.S. paper exports (including products)	Sept.	700	20.7	8,308	21.2
Exports of unbleached kraft linerboard	Sept.	241	12.6	3,027	12.9
Exports of woodpulp	Sept.	517	-1.7	6,365	6.3
Norscan pulp inventories[4]	Oct. 31	1,462	2.9		
Norscan pulp operating rates[4]	Oct.	88%	75%	89%	86%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Oct.	735	3.5	7,232[6]	-5.4
Operating rates	Oct.	79%	78%	87%	90%
Inventories held by U.S. consumers	Oct. 31	1,324	4.3		
Other paper/board shipments	Oct.	696	1.3	6,246	0.0
Woodpulp shipments (export only)	Oct.	727	1.3	7,007	10.0
Operating rates	Oct.	86%	88%	87%	87%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Tissue: Producers strive to overcome impact of premium bath tissue decline

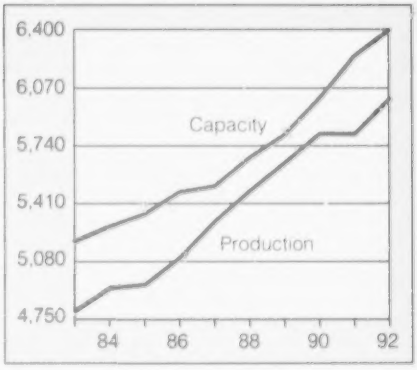
Grade structure: The tissue market includes two major sectors: sanitary and "other." Sanitary products form the larger category and include bathroom and facial tissue, toweling, napkins, basestock for sanitary stock, wadding, and wipes. The "other" group accounts for just 2% of the market, and includes basestock for waxing, wrapping, and miscellaneous uses. The two major outlets for tissue are consumer, and commercial and industrial (C&I). Consumer tissue accounts for nearly two-thirds of the market and is purchased at retail outlets. Industrial tissue goes to hotels, offices, restaurants, factories, and institutions. Consumer tissue growth is expected to be less than half that of commercial products over the next few years. Typical basis weights for tissue include 12 to 14 lb/3,000 ft^2 for single-ply bathroom tissue and 32 to 39 lb/3,000 ft^2 for single-ply towel.

Production/capacity: Tissue production in 1990 reached 5.802 million tons and stood at an annualized rate of 5.681 million tons for the first nine months of 1991, down 1.7% from the same period a year earlier. Operating rates reached 96 to 97% in 1990 and 93 to 94% through September 1991. These rates were kept up in spite of a number of expansions. In March 1991 Fort Howard Corp. expanded its Savannah River Mill in Rincon, Ga., by 30%, or an estimated 88,000 tpy, with the tissue going primarily to the C&I market. The company is also building a new machine at its mill in Green Bay, Wis., that is due online in first-quarter 1993. Mosinee Paper Corp. started up a rebuilt 60,000-tpy toweling machine at its Bay West Paper Corp. unit in September and was also working on a new tissue machine to start around the turn of the year. Scott Paper Co. has approved a land purchase near Owensboro, Ky., on which to build a $300-million-plus tissue mill, with site prep to begin in February or March.

Outlook: Producers in both the consumer and C&I sectors were chilled by the 1990-91 recession. Tissue markets became more competitive as demand slowed and as new products—in particular, Kimberly-Clark Corp.'s new Kleenex premium consumer bathroom tissue, produced at a new mill in Jenks, Okla.—churned up the market. In the C&I sector, a new mill in 1990 from K-C in Loudon, Tenn., and Fort Howard's new Rincon, Ga., capacity weakened the market, noted George Adler, an analyst with Smith Barney, Harris Upham & Co. The recession also reduced employment, cutting down on C&I demand. However, with other producers adjusting to K-C's presence in premium bath tissue and with the economy improving, the industry's prices and profits could pick up this spring. Jeanne Carroll, an analyst with Morgan Stanley & Co. Inc., believes the sector will remain favorable over the next few years because of limited new supply and favorable pricing of raw material.

Prices: K-C's reemergence into the premium consumer bath tissue business in September 1990 sparked a round of promotional activity among its competitors, forcing down producers' margins significantly. In mid-1991, market leader Procter & Gamble Co. dropped list prices and sheet counts on its Charmin and White Cloud brands. Scott, James River Corp., and K-C followed P&G's lead with varying combinations of price and/or sheet count reductions over the next several months. However, by January 1992 P&G managed to reduce trade promotion allowances on Charmin and White Cloud in an effort to rebuild margins. In general, consumer towel and facial tissue prices have not suffered a similar decline, though promotions did heat up some towards the end of 1991 because of high inventories, said Carroll. Across-the-board price hikes of 5% announced at the end of August 1991 for C&I tissue have yet to be put through, she added. Because of the highly competitive market for consumer tissue paper, the price of tissue paper per ton is not readily available. Price trends tracked by the Bureau of Labor Statistics' Producer Price Index (PPI) show relative changes in price levels. Note that this is not a dollar/ton price. The PPI for converted sanitary paper products, including unconverted stock, is as follows (1982 = 100): 1987, 109.1; 1988, 115.0; 1989, 126.0; 1990, 135.4; 1991 (November), 136.5. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1990	1991e	1992e
Production	5,802	5,800	6,000
Capacity[1]	6,005	6,241	6,390
Utilization rate	96.6%	92.9%	93.9%
Imports[2]	131	80	80
Exports[2]	35	60	55
Apparent U.S. consumption	5,898	5,820	6,025
lb/capita	47.2	46.1	47.3
GNP ratio	1.42	1.41	1.43

e = Estimate.
1. American Paper Institute data. 2. U.S. Dept of Commerce data.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Scott Paper	1,150	18.0
2. James River	1,100	17.2
3. Fort Howard	1,030	16.1
4. Procter & Gamble	810	12.7
5. Georgia-Pacific	567	8.9
6. Kimberly-Clark	550	8.6
7. Chesapeake	190	3.0
8. Pope & Talbot	145	2.3
9. Potlatch	120	1.9
10. Orchids Paper	110	1.7

Market share of top five companies:
72.9%
Market share of top ten companies:
90.3%
Total U.S. capacity (1991):
6.390 million short tons

CAPACITY

U.S. industry to add 7.4 million tons by 1994

Over the next three years, U.S. pulp and paper companies plan to add 2.5 million tons of new woodpulp production capacity and 4.9 million tons of new paper and paperboard capacity. With these additions, U.S. paper and board capacity will increase at a 1.9% annual rate and reach 91.9 million tons in 1994. This annual rate of capacity growth during 1992-94 will be lower than the 3% increase in U.S. paper and paperboard capacity in 1991, which followed a 2.7% increase in 1990. The reduced level of investments in new production facilities reflects the current conservative business climate along with the escalating spending on environmental projects that contributes very little, if anything at all, to increased industry output, said American Paper Institute president Red Cavaney at a news conference held last week in New York City.

The API's annual capacity survey also projects new investments in recycling facilities and greatly expanded use of wastepaper in the manufacture of paper and paperboard. Wastepaper use is forecast to increase by almost 5 million tons between 1991 and 1994, based on already installed or approved additions to recycling operations. Wastepaper consumption at U.S. mills is expected to increase to 28.7 million tons in 1994. With these planned expansions, wastepaper will contribute more than 30% of the industry's raw material supply in 1994 and will require a major increase in municipal and private collection programs. This expanded level of activity shows substantial progress toward the industry's current voluntary goal of recovering a full 40% of the nation's paper consumption for domestic recycling and exports by 1995, Cavaney commented.

Fewer new machines. For the first time in several years, capacity increases from machine rebuilds and other improvements to existing facilities will exceed capacity additions from new paper machines or greenfield mills.

Over the next three years, nine new paper machines with total nameplate capacity of 1.3 million tons will be brought into production. Only one of these machines will be located in a new greenfield mill, which is now under construction by Temple-Inland Inc. During the preceding three-year period of 1989 to 1991, 28 new machines with total capacity of almost 5 million tons were brought into production, and a significant number of these machines were placed in greenfield mills.

U.S. PAPERBOARD ANNUAL CAPACITY, 1991-94
Practical maximum basis (000 short tons)

Grades	1991	1992	1993	1994
Total all grades	**89,056**	**91,062**	**92,703**	**93,979**
Total paper/board	**86,960**	**88,966**	**90,604**	**91,880**
Total paper	**43,766**	**44,981**	**45,696**	**46,362**
Newsprint	7,069	7,288	7,380	7,409
Printing/writing	25,119	25,945	26,435	26,983
Uncoated groundwood	1,923	1,930	1,933	1,934
Coated groundwood	4,426	4,463	4,520	4,547
Coated free-sheet	4,031	4,268	4,463	4,616
Uncoated free-sheet	12,981	13,482	13,709	14,072
Cotton fiber	204	205	205	205
Thin papers	225	255	255	255
Bleached bristols	1,299	1,342	1,350	1,354
Packaging and industrial converting	5,337	5,358	5,345	5,337
Unbleached kraft	2,703	2,690	2,653	2,633
Bleached kraft	484	485	488	493
Specialty packaging	692	710	722	723
Special industrial	1,458	1,473	1,482	1,488
Tissue	6,241	6,390	6,536	6,633
Total paperboard	**43,194**	**43,985**	**44,908**	**45,518**
Unbleached kraft	21,986	22,353	22,369	22,562
Kraft linerboard	19,989	20,309	20,293	20,466
Solid bleached	4,886	4,967	5,122	5,353
Semichemical	5,957	6,025	6,089	6,097
Recycled	10,365	10,640	11,348	11,506
Containerboard	2,900	3,099	3,717	3,811
Construction paper and board	2,096	2,096	2,099	2,099

U.S. MARKET WOODPULP CAPACITY, 1991-94
Practical maximum basis (000 short tons)

Grades	1991	1992	1993	1994[1]
Total market woodpulp	**10,189**	**10,815**	**11,065**	**11,140**
Dissolving	1,500	1,507	1,509	1,517
Chemical paper grades	8,689	9,308	9,576	9,623
Sulfite paper grades	309	309	314	315
Sulfate paper grades	8,380	8,999	9,262	9,309
Bleached softwood	5,068	5,478	5,705	5,753
Bleached hardwood	3,130	3,328	3,362	3,362
Unbleached	182	193	195	195

1. Capacity additions presented here for 1994 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

Source: American Paper Institute.

While only one new greenfield paper mill is scheduled for startup in 1992-93, three new world-class pulp mills with annual capacity to produce nearly 1 million tons of bleached sulfate market pulp are scheduled to begin production during 1991-92. Two of the mills constructed by Stone Container Corp. and Union Camp Corp. are now in production. A third mill currently under construction by Alabama Pine Pulp Co. will be brought online in 1992. By 1994, the U.S. industry capacity to produce market pulp will reach 11.1 million tons, with chemical paper-grade market pulp accounting for 86.4% or 9.6 million tons of the total.

Woodpulp. Growth in total woodpulp capacity follows a trend similar to paper and paperboard, with lower expansion rates in future years after back-to-back annual increases of 2.2% in 1991 and 2.4% in 1992. During 1993 and 1994, total woodpulp capacity is expected to increase at a rate of only 0.7%/year.

As a result of the increased use of wastepaper at U.S. paper and board mills, consumption of woodpulp and other miscellaneous fibers is projected to only increase by 1.8% annually between 1990 and 1994. This compares with a strong 6.8% average annual increase in wastepaper consumption during the same period.

A growing demand for paper products containing recycled materials has stimulated an expansion in deinked market pulp capacity. Based on publicly announced projects, capacity for deinked market pulp is expected to increase from an estimated 325,000 tons in 1991 to about 1 million tons in 1994. At the same time, the number of producers of deinked market pulp will increase from just three companies to as many as eight companies by 1994.

Newsprint. The startup this year of North Pacific Paper Co.'s new 245,000-tpy machine is contributing to a rapid rate of expansion in U.S. newsprint capacity. Between 1989 and 1991, five new machines were brought online and capacity has increased by 16% or 954,000 tons during this period to reach 7.1 million tons this year. This rapid capacity buildup now appears to be subsiding, although 340,000 tons of new capacity, mostly residual gains from earlier expansions, will be added during 1992-1994.

Also, the newsprint industry is stepping up its recycling capabilities to meet publishers' demands for recycled-content newsprint. At least 13 new deinking plants are now in varying stages of construction or under active study at existing newsprint mills. These projects will increase recycling of old newspapers and magazines by an additional 1 million tons by 1994. In addition, five completely new recycled newsprint mills are now under study. Although none of these projects have yet been approved, they have the potential of recycling approximately 1.3 million tons of wastepaper, according to API.

Printing and writing papers. U.S. industry capacity to produce printing and writing papers will grow at an annual rate of 2.4% during 1992-94, reaching nearly 27 million tons in 1994. Capacity growth will be led by the uncoated free-sheet grades, which will add 1.1 million tons of new capacity for an average annual increase of 2.7%. Coated free-sheet grades will add 585,000 tons for an

GROWTH TRENDS IN U.S. CAPACITY
(000 short tons)

Grades	Additions 1992-1994 3-year increase	Additions 1992-1994 Average annual growth	Additions 1981-1991 10-year increase	Additions 1981-1991 Average annual growth
Total all grades	4,923	1.8%	16,801	2.1%
Total paper/board	4,920	1.9	18,787	2.5
Total paper	2,596	1.9	10,059	2.6
Newsprint	340	1.6	1,612	2.6
Printing/writing	1,864	2.4	7,817	3.8
Uncoated groundwood	11	0.2	298	1.7
Coated groundwood	121	0.9	1,379	3.8
Uncoated free-sheet	1,091	2.7	4,153	3.9
Coated free-sheet	585	4.6	1,786	6.0
Packaging and industrial converting	—	—	(576)	(1.0)
Tissue	392	2.1	1,206	2.2
Total paperboard	2,324	1.8	8,728	2.3
Unbleached kraft	576	0.9	5,248	2.8
Kraft linerboard	477	0.8	4,617	2.7
Solid bleached	467	3.1	745	1.7
Semichemical	140	0.8	969	1.8
Recycled	1,141	3.5	1,766	1.9
Containerboard	1,086	9.5	1,061	4.7
Construction grades	3	—	(1,986)	(6.4)
Total all grades	2,488	1.2%	10,571	1.7%
Total woodpulp for paper and board	2,488	1.2	11,905	2.0
Dissolving	—	—	(105)	(0.7)
Sulfite	(46)	(0.9)	(158)	(0.9)
Sulfate	2,633	1.7	10,632	2.3
Bleached	2,785	3.1	8,754	3.6
Unbleached	(152)	(0.2)	1,931	0.9
Semichemical	(74)	(0.5)	(50)	(0.1)
Mechanical	(25)	(0.1)	1,586	2.6
Construction grades	—	—	(1,334)	(11.0)
Total all grades market woodpulp	951	3.0%	3,217	3.9%
Chemical paper grades	934	3.5	3,314	4.9

( ) = decrease.
Source: American Paper Institute.

annual increase of 4.6%. New machines are planned by Consolidated Papers Inc. and Champion International Corp. During the last two years, six new machines with capacity to produce 1.6 million tons of uncoated and coated free-sheet papers began production.

Although planned capacity expansions for printing and writing papers will trail historical levels, consumption of wastepaper at these mills will increase by an estimated 32% by 1994. Much of the increased use of recovered wastepaper will be in deinked grades, with consumption expected to increase 14.7% annually during the next three years.

Tissue. Capacity for the household and commercial tissue grades will grow at an annual average rate of 2.1% during the next three years. This rate will add 392,000 tons of capacity and bring the industry total to 6.6 million tons in 1994. This tissue expansion includes the startup of five new paper machines that will provide 75% or 292,000 tons of the total increase. Three of these machines are designed to use wastepaper. As a result, wastepaper consumption at tissue mills will increase by 453,000 tons by 1994.

Containerboard. Estimates for future containerboard capacity have recently been revised downward. For 1993 alone, total capacity has been reduced by 595,000 tons, mostly for unbleached kraft linerboard, but also for recycled corrugating medium. Projects with longer lead times have been delayed or cancelled, while committed projects with shorter lead times and less flexibility have gone ahead. For example, Lin Pac Inc. is on schedule with construction of a 90,000-tpy recycled linerboard mill for startup in March of 1992, and Temple-Inland Inc. is on schedule for the startup of its new 210,000-tpy greenfield recycled linerboard mill sometime in late 1992.

Meanwhile, a greenfield mill with capacity to produce 350,000 tpy of recycled containerboard that was proposed by Daishowa America Co. Ltd. and Trans-Rim Enterprises Ltd. has been indefinitely postponed. In addition, in early 1991 Gaylord Container Corp. shut down two paper machines with total capacity of 300,000 annual tons of kraft linerboard and recycled corrugating medium.

Taken as a whole, capacity for containerboard should reach 30.6 million tons in 1994, and the rate of growth should average 1.7%/year over the period 1992-94. As with other paper grades, wastepaper use will expand rapidly from a base of 7.8 million tons in 1991 to an estimated 9.7 million tons in 1994. The rate of increase in wastepaper consumption will be approximately 8%/year through 1994, and old corrugated containers will comprise 95% of the total.

Bleached and recycled boxboard. The recent decision from Westvaco Corp. to delay the installation of a new bleached paperboard machine at its Covington, Va., mill from 1992 to late 1993 will lower the growth rate for solid bleached sulfate (SBS) to a 3.1% average annual rate. While lower than last year's estimate, total capacity will still climb to 5.4 million tons in 1994. Most of the incremental capacity growth in 1992 and 1993 will come from machine rebuilds and improvements that have been completed during the last two years.

Although much focus has been directed to the recycled containerboard grades, more than 70% of all recycled paperboard is converted into folding cartons, rigid setup boxes, tubes, cans, drums, and other packaging and nonpackaging products. Capacity to produce these grades will increase approximately 1%/year from about 7.5 million tons in 1991 to 7.7 million tons in 1994.

Consumption of wastepaper, which provides virtually 100% of the raw material for these recycled grades, shows a corresponding increase from 7.5 million tons in 1991 to an estimated 8 million tons in 1994.

The API 1991 Capacity Survey is available for $375 in the U.S. and $395 oversees from Dept. CMS, American Paper Institute, 260 Madison Ave., New York, N.Y. 10016. Phone: (212) 340-0600. Fax: (212) 689-2628. ■

UNCOATED FREE-SHEET

Willamette plans 600-tpd machine for Penntech

Willamette Industries Inc. said last month that it will install a 600-tpd uncoated free-sheet paper machine at its Penntech mill in Johnsonburg, Pa. The machine is slated to produce specialty papers plus some commodity grades when it comes online by late 1993. The new Valmet machine will join five others at Penntech and is smaller than the one Willamette installed at its greenfield mill in Bennettsville, S.C. in 1990. The new Penntech machine will have a 232-in. trim and top-rated capacity of slightly over 200,000 tpy, according to spokeswoman Cathy Baldwin.

Willamette acquired the 400-tpd Penntech mill a little over two years ago. Since then, it has been researching operations and working to initiate a number of needed improvements at the facility.

Last year, the company said it was looking at a variety of capital projects, including a possible new uncoated free-sheet machine at Hawesville, Ky., and various improvements to Penntech. Projects underway at the mill include a new water effluent treatment system, a new recovery boiler, and a steam turbine cogeneration plant. Additional operations already in progress include the installation of new winders, a new lime kiln, and a recausticizing unit. These projects are scheduled for completion in December 1992.

Not including the Penntech project, U.S.-based uncoated free-sheet paper capacity is expected to rise about 2.7%/yr, or almost 1.1 million tons, in the 1992-94 period, according to the American Paper Institute's most recent capacity survey. API projects 1993 capacity at just over 13.7 million tons, rising to almost 14.1 million tons in 1994.

The only other new machine due online between now and the end of the survey period is Champion International Corp.'s 240,000-tpy project at Courtland, Ala., which is also scheduled for a late 1993 startup. However, there is remaining new capacity from recent startups at Boise Cascade Corp. at International Falls, Minn.; Union Camp Corp. at Eastover, S.C.; and Georgia-Pacific Corp. at Ashdown, Ark. Along with this, there is additional competition from new machines in Mexico and Brazil, plus existing capacity in Canada and Finland, among others. ■

Quality Awareness, Mill Acceptance Intensifies In N.A. Paper Industry

Survey of quality management practices shows more mills are implementing quality programs and expanding their knowledge of emerging quality standards

By KELLY H. FERGUSON, Deputy Editor

More and more North American pulp and paper mills are discovering the benefits of quality control/quality management programs, and even though they lag behind some other industries in full implementation, awareness of these benefits is growing quickly. In tight economic times, such as the current industry downturn, mills are finding that quality programs can better streamline and improve their process and that exhibiting the "badge" of quality can help attract potential customers.

More mills are also paying attention to the quality system standards set forth in both the International Standards Organization's (ISO) 9000 series and the U.S.'s Malcolm Baldrige Award. Westvaco Corp.'s Covington, Va., mill, for example, became the first North American mill to meet the quality system standards of ISO 9002 and become certified (see mill profile, p. 76). Westvaco's management said it recognizes the opportunity of selling its bleached board in foreign markets and thus undertook the time-consuming process of registration.

A *Pulp & Paper* survey of North American quality control/quality management practices indicates that mills continue to search for the correct combination of quality tools, employee interest, and management commitment. Most mills surveyed remain in the very early stages of implementation but are quickly learning about the frustration and rewards that come with cultivating a quality management program.

The 1992 survey queried mills about their efforts to implement quality programs, use of quality tools, sources of information for program development, process areas best suited for specific quality efforts, and thoughts on leaders in the quality field. The results of this year's survey are compared, where appropriate, with the results from a similar survey published last year (P&P, Mar. 1991, p. 71).

The 1992 survey covers a wide range of mills within the pulp and paper industry of North America:

- Mills from 24 U.S. states and five provinces in Canada
- Twelve major pulp, paper, and board grade mills
- Mill sizes ranging from 5,000 tpy to 800,000+ tpy

Quality leaders

Just as in the 1991 survey, this survey asked respondents to name quality leaders within the pulp and paper industry and also some outside the industry.

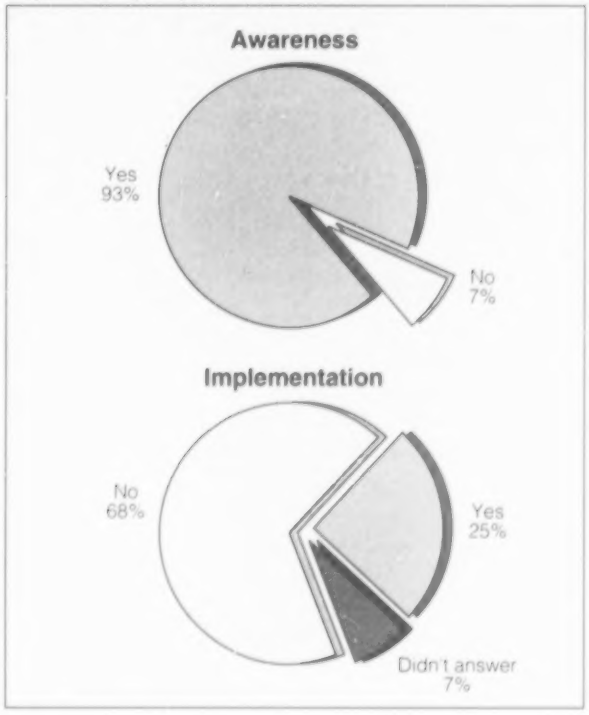
Pulp and paper quality leaders:

Chesapeake Corp.
Consolidated Papers Inc.
Container Corp. of America
Daishowa Inc.
Dexter Corp.
Eastman Kodak Co.
Federal Paper Board Co., Inc.
International Paper Co.
James River Corp.
Kimberly-Clark Corp.
Kruger Inc.
MacMillan Bloedel Ltd.
Mosinee Paper Corp.
Prince George Pulp & Paper
Procter & Gamble Paper Products Co.
Quebec & Ontario Paper Co.
Scott Paper Co.
Jefferson Smurfit Corp.
Stone-Consolidated Inc.
Union Camp Corp.
S.D. Warren Co.
Westvaco Corp.
Weyerhaeuser Paper Co.
Willamette Industries Inc.

Other quality leaders:

3M
Asten Hill
AT & T
B.F. Goodrich
Cadillac
Cannondale
Chrysler
Dole Foods
Du Pont
Federal Express
Florida Power & Light
Ford
General Electric
Harley Davidson
Hewlett-Packard
Honda
IBM
McDonald's
Milliken
Motorola
Nissan
RJR Nabisco
Toyota
United Parcel Service
Volvo
Xerox

FIGURE 1: **Awareness and implementation of such quality standards as those associated with the ISO 9000 series and the Malcolm Baldrige Award are on the rise in the North American paper industry, indicating companies are putting more emphasis on quality.**



• Respondents from quality control and technical departments, as well as some mill general managers and process engineers.

QUALITY PROGRAMS MULTIPLYING. The majority of mills (90%) responding to the survey said they had some type of active, ongoing quality program. However, what constitutes a quality improvement/quality management program was basically left to the respondents' discretion—a complete program for one mill could be the use of only a minor improvement tool for another.

Of mills that said they have some type of quality program, most combine the "tools" as a foundation for their efforts. Statistical process control/statistical quality control (SPC/SQC) remains a favored method to achieve improvements and consistency, with 50% of mills saying they use it as part of their overall program. This represents an increase over the 1991 survey from 43.5%.

Quality improvement teams (42%) was the second most-used method, followed by total quality management (25%) and quality circles (8%). Other methods listed by respondents included daily or monthly quality meetings, quality councils, and ISO-9000 guidelines. Since most mills use a combination of these programs, these percentages do not equal 100%.

Mills are becoming more aware of such structured quality standards as the previously mentioned ISO-9000 standards and Malcolm Baldrige award. Ninety-three percent of respondents said they are aware of these systems, significantly higher than the responses in the 1991 survey, and 25% said they had implemented a structured system—most using the ISO standards.

As stated previously, North American pulp and paper mills seem to be only in the beginning stages of true quality implementation. The largest number of mills, when asked the year their quality program began, said the second half of the 1980s (43%), and most of those were in the years of 1988 and 1989. The trend of more mills instituting quality programs is evidenced by the increase in respondents who said that such programs had been started at their mills in the 1990s—17% said the 1990s in last year's survey compared with 28% in this year's survey. Also, only 20% of the respondents said they had no program or gave no date of implementation, compared with 35% in 1991.

Mills continue to keep their program development in-house, relying less on consultants and even corporate assistance. Fifty percent of the respondents said their program was developed in-house only, and 81% said they were involved in development at some level. Of the two other groups that were sole sources for program development—corporate and consultants—about 9% of the mills used consultants alone and about 7% used corporate staff only. Other programs were developed by mill/corporate, mill/corporate/consultant, and mill/vendor teams.

All quality experts attest that management is the key to true quality manufacturing and service. Whether a company is truly quality conscious depends on the commitment of top level management to the quality program. But experts also agree that employees must share in the commitment as much as management.

Compared with the 1991 survey, quality programs are beginning to take a better hold at paper mills, and upper management is leading the way (Figure 1). Mills were asked first to rate how firmly established their quality control program was on a scale of 1 (almost nonexistent) to 5 (well established), and then to rate the level of commitment (1=limited commitment, 5=total commitment) of three major groups: top management, supervisors, and operators.

Of the mills that have a quality program, only 3% said their program was almost nonexistent, compared with 15% in 1991 (Figure 2). A larger number of mills feel they are at a level of medium involvement (43% in 1992 vs 31% in 1991). However, the number of respondents that feel their program is well established has declined (7% in 1992 vs 12% in 1991). One possible reason for this drop is that quality leaders in the mills are learning more about what is involved in truly establishing a quality program at mills.

Upper management seems to be getting more involved, with 30% having total commitment to quality programs and 48% having heavy commitment. That

compares with 24% total commitment and 31% heavy commitment in 1991. It is at the supervisory and operations level where commitment declines. But since it is management that must set the example for others in the company, these numbers are not unexpected. Supervisors and operators, according to respondents, are basically at a medium commitment level (48%). However, supervisors, as expected, are at a higher commitment level than operators.

Before commitment can be made to the quality program, operators must be involved in that program. Asked how important operator involvement is in a quality program, the majority of respondents (85%) said extremely important (Figure 3) and 12% said highly important.

Respondents were then asked to what extent their own mill operators were involved. Even though involvement seems to improve, operators are still far below the desirable level of most respondents. Only 12% said their operators were very involved; 23% claimed heavy involvement. Most respondents said operators were at the level of medium involvement (33%), slight involvement (20%), or limited involvement (12%). Those numbers match up to the 1991 survey as follows: very involved (9%), heavy involvement (13%), medium involvement (45%), slight involvement (28%), and limited involvement (6%).

Other aspects of mill quality programs include the following:

- Sixty percent said they have a written quality policy, compared with 48% in 1991.
- Twenty-seven percent said they have a written quality manual, compared with 35% in 1991 (this decrease can only be explained by the mix of participants between years although responses for most questions have remained closely linked).

Of mills that do have a written quality policy, 81% said they developed it in-house; 19% said they collaborated with consultants.

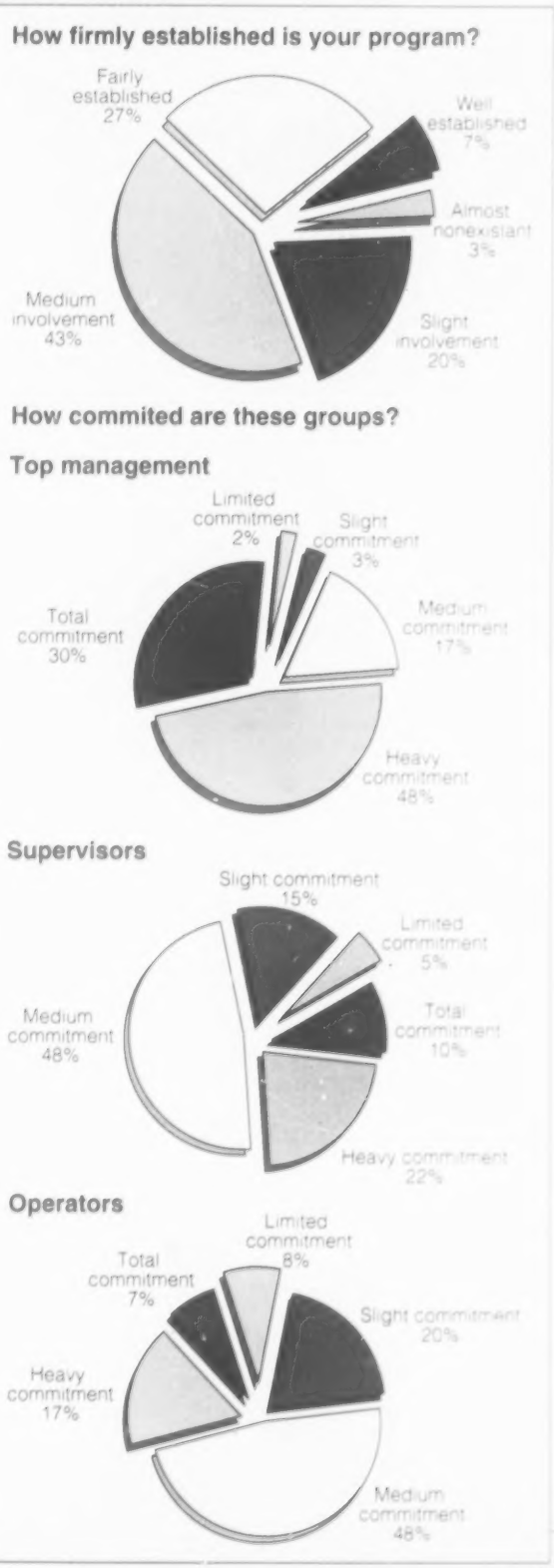
Competition is the driving force behind mill quality programs (cited by 70% as a factor), followed by cost savings (30%) and strategy (30%).

Since many mills cited a combination of these forces, the numbers do not add up to 100%. Other factors listed include customer demand, top management, and conformance to corporate mandate.

QUALITY TOOLS AND PROGRAM EMPHASIS. At one time, end-product testing was the only real method of quality determination for any manufacturing operation. And while testing is still very prevalent and necessary today, mills are adding quality tools to ensure high-quality raw materials and reduce process variability.

Nearly all (98%) mills use end-product testing as one of their primary methods for determining quality (Figure 4). However, raw materials testing (75%) and vendor certification (42%) are being used more frequently to track incoming materials, while process control systems (77%) and SPC/SQC (62%) are helping operators maintain consis-

FIGURE 2: **Quality programs are taking hold in the industry, with upper management leading the way. But because such programs are so new, the commitment has not filtered down to supervisors or operators.**



tency throughout the paper and boardmaking process.

Indeed, based on a scale of 1 to 5, 85% of respondents said process automation was "fairly important" to "very important" (3 to 5) for their quality control program. This percentage is a significant increase over the 76% that responded similarly in the 1991 survey.

Control charts are used by many mills to analyze and maintain process consistency. The survey showed that 37% of the mills chart manually, 12% use automated methods, 26% use a combination of manual and automated charting, and 25% did not use control charts.

Besides specific process tools, mills were asked what sources of information they turned to for reference and refining of their quality control programs. Conferences and seminars (68%) and associations (65%) were two of the most important sources, followed by training programs (63%) and trade magazines (60%).

Mills were also asked what specific process areas were focused on when using their quality control/improvement programs and were then asked what process areas could most benefit from such programs. Not surprisingly, answers were similar for both questions. Some of the projects follow:

- *Woodyard:* chip quality, chip thickness screening, and purchased chip quality improvement
- *Pulp mill:* online kappa digester control, improved control of refiners, pulp brightness, bleach plant brightness control, pH control in the bleach plant, and stock blending
- *Paper mill:* color control, cross direction weight and moisture control, stock prep system, gloss control, CSF calibration, porosity control, paper machine centerlining, forming area, roll uniformity, strength improvements, improved retention, coating solids, surface size solids, parent roll storage and handling improvements, rewinder workmanship, and reduced surface contamination.

FIGURE 4: **Although product testing remains a major method of determining quality, process monitoring and raw materials testing are becoming more prevalent.**

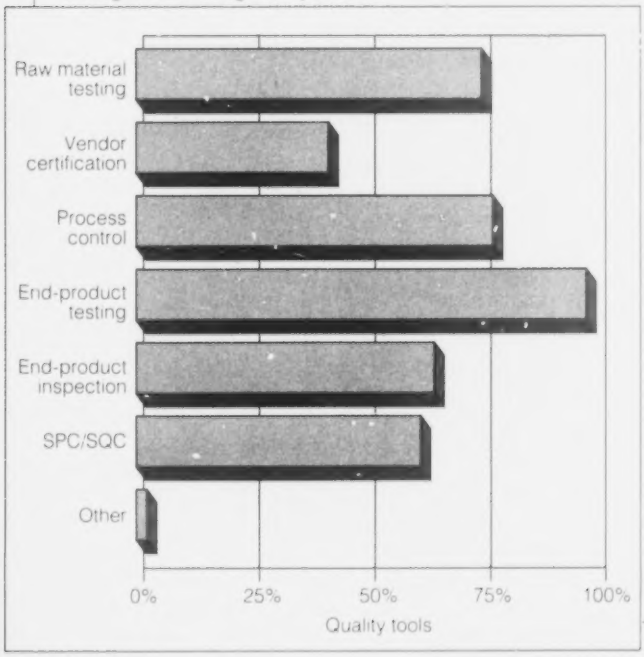
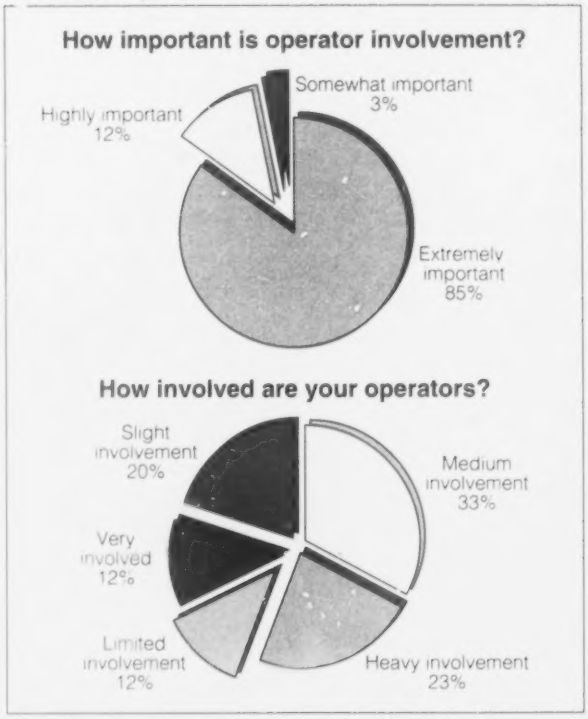


FIGURE 3: **Most survey respondents felt operator involvement was of prime importance in their quality programs, but most are not at that level yet.**



THE QUALITY CHAIN. Customers are the driving force in industry, and no less so with quality control. If a customer demands that a mill show evidence of quality control efforts, mills are pushed to implement some type of program. The same should be true for paper mills and their suppliers. Thus, a quality chain is formed that continues to work back as far as the links (suppliers) in that chain can be pressured.

When asked if customers require them to have some form of quality program other than finished product testing, 40% of respondents said "yes". That same 60/40 split was true in the 1991 survey. On the other end of the relationship, only 13% of respondents said they required quality programs from their suppliers. That number has actually *decreased* from 27% in the 1991 survey.

Other "quality chain" elements follow:

- Thirteen percent said their customers require quality data on product shipments, and 68% said it depends on the customer. Of that quality data, most comes in the form of averages and standard deviation and/or raw data.
- Thirteen percent said their customers required process data.
- Sixty-eight percent of the mills said they require quality data on product shipments from their suppliers. ■

Paper Industry Salaries Ride Cycle to New High with Median of $57,000

Recent expansion, capital spending boom pays off for industry engineers, but job morale continues to decline with economic downturn

By KELLY H. FERGUSON, Deputy Editor

Reflecting the peak of several years of expansion and growth in the pulp and paper industry, professional salaries seem to have made a significant leap just as the industry downturn began, according to *Pulp & Paper*'s 1991 salary and opinion survey. But at the same time the industry has turned down, job morale has also taken a dive and a slightly larger percentage of respondents say they dislike their current job.

The 1991 survey indicated a median salary (without bonuses, etc.) of $57,000, an 8% increase from the 1990 median salary of $53,000 (Table 1). This rise does not correspond exactly to the average salary increase reported (6%), which would yield a salary slightly more than $56,000. However, a normal margin of error would provide for a 1% to 2% swing in salaries.

One very significant change in total salaries was the amount of bonuses, overtime, or other professional income earned by respondents. The median bonus amount reported in last year's survey was $2,000. The 1991 median bonus was reported as $5,000, a 150% increase. Although that number may be skewed somewhat by some respondents reporting enormous bonuses, a significant increase in bonus money would be expected because of the high profits made by paper companies in the past few years. Surveys in the next few years will probably show that bonus amount declining as company profits decline.

BACKGROUND OF SURVEY. *P&P*'s annual survey is based on responses to a questionnaire included in the September 1991 issue. Information from the returned forms was processed by an independent data processing firm according to *P&P*'s specifications. Data from 1991 are compared with data from our 1990 and 1989 surveys to provide readers perspective on changes in compensation, benefits, and employee attitudes.

The report is designed to compare the progress of employees (specifically engineers) in the paper industry, on the supplier and consulting side as well as in primary manufacturing, with professional peers in various other disciplines. In addition, the report also compares the salaries of specific engineering types and functions within the paper industry.

AN OVERALL PROFILE. Respondents' median income increased 8% from 1990 (Table 1). Salaries had taken a slight dip in 1989 to $52,000 and then rose back to the 1988 level ($53,000) in 1990. Comparing various results from those years, the small decline was attributed to retirement of some older, higher-paid respondents and the influx of younger engineers to handle the numerous capital projects going on in those years. Salaries now seem to be more on the standard track, with percentage increases from 1990 to 1991 showing a more traditional trend.

Most respondents (88%) continue to be happy with their jobs, but more are dissatisfied vs last year's survey (12% vs 10%). And the attitude of respondents continues to be negative as the industry remains in a down cycle. In 1989, 85.3% said they would stay in the paper industry if they changed jobs. Comparing 1990 and 1991 re-

TABLE 1: **Salary distribution of all respondents.**

	1991	1990	% Change
Lower decile	38	36	5
Lower quartile	45	43	5
Median	57	53	8
Upper quartile	70	67	4
Upper decile	84	82	2

TABLE 2: **Benefits of respondents.**

Benefits	% of respondents 1991	1990
Medical insurance	99	98
Life insurance	95	94
Retirement pension plan	86	88
401-K plan	73	NA
Dental insurance	86	85
Education allowance	50	50
Stock option plan	35	39
Profit sharing	34	38
Bonus plan	34	34
Travel budget	22	25
Company car	12	12

sults, 64% of respondents (in both surveys) said they would stay in the industry, but more said they would leave the industry (8% in 1991 vs 4% in 1990).

General job morale is also still declining. When asked to rank their morale on a scale of 1 (bad) to 5 (good), more respondents rated their morale lower than in 1990. A breakdown of the past job morale rankings shows a steady decline in the past three years:

	1991	1990	1989
One	6%	4%	7%
Two	13%	12%	13%
Three	26%	23%	No response
Four	38%	41%	50.9%
Five	17%	20%	29.1%

Some experience continues to leave the industry, according to the past three surveys, but loss seems to have slowed. In comparing the distribution of years of experience in the industry, there was about a 5% decrease in respondents with 10 to 20 years experience from the 1990 survey. The median number of years of experience dropped slightly, from 18.3 years in 1990 to 18 years in 1991.

Mechanical engineers made up the largest percentage of bachelor degrees for respondents (18%), followed by chemical engineers (16%). Business degrees dropped slightly (14% in 1991 from 16% in 1990), as did paper science and technology (13% vs 14%).

Other averages for respondents follow: the majority is male (94%), has a bachelor's degree (61%), works for a wood products/pulp and paper manufacturer (66%) in either production/mill operations (19%), engineering design (16%), engineering maintenance (13%), or technical service/quality control (12%). Possibly because of good times in the industry, job stability has improved, with 17% of respondents having changed employers in the last three years, compared with 20% in last year's survey.

Additional statistics follow:

Compensation

- There was an average of three salary increases in the past three years.
- The last pay increase for respondents was 6%.
- Eleven paid holidays and three weeks of vacation are taken yearly.
- Most salaries are reviewed annually (92%) and are based on merit/performance (52%), cost of living (5%), or both (29%).
- Eighty-two percent are not paid overtime.
- Fifty-two percent have not been promoted in the past three years, while 36% have been promoted once.

TABLE 3: **Income and principal work function (all respondents).**

Principal function	Lower decile	Lower quartile	Median	Upper quartile	Upper decile	% of change in median (1989-1990)
Administration	46	52	75	104	155	21
Research & development	40	49	61	72	84	2
Consulting	46	60	73	88	108	12
Engineering design/ construction	39	49	62	75	88	17
Teaching/academic research[1]	28	39	58	75	85	45
Product development	35	46	53	68	80	4
Production & mill/plant operation	42	48	59	75	96	9
Engineering/maintenance	39	45	53	62	72	–
Sales and marketing	40	53	67	96	120	20
Technical service/ quality control	35	41	48	60	73	7
Other	33	42	60	75	92	15

1. Limited response in this category could mean the data is not statistically significant.

TABLE 4: **Income and level of supervisory management (all respondents).**

Supervisory responsibility	Lower decile	Lower quartile	Median	Upper quartile	Upper decile	% of change in median (1989-1990)
None	31	39	50	59	72	11
Indirect or staff	36	44	53	66	81	10
Team or unit	39	47	56	65	77	8
Project or section	40	50	61	70	85	11
Major department or division management	49	62	76	94	115	13
Corporate management or organization	50	71	102	148	200	28

Personal

- Ninety-seven percent of respondents work full-time; 2% are self-employed.
- The average respondent works about 45 hr/week.
- Eighty-seven percent have some kind of management responsibility; the majority have indirect or staff (25%), followed by project or section (20%), major department or division (19%), or team or unit (17%).
- Twenty-five percent have advanced degrees (master's, doctorate, or MBA).
- Thirty-seven percent came from another industry.

Morale

- Twenty-one percent say their company does not listen to them or value their experience (an increase of 3% from 1989).
- A new question was asked to determine what employees felt promotions were based upon: 69% said performance/merit, 22% said politics, 14% said degree/job function, 8% said seniority, and 6% said other.

ANALYZING EFFECTS ON INCOME. Tables 1 through 5 and Figures 1 and 2 present survey findings on compensation compared with a number of variables, including principal work function, supervisory level, and region of North America. Comparing income and type of employment organization shows that consultants have the highest median income at between $71,000 (consulting firm) and $77,000 (self-employed consultant). Income figures in all tables, except Table 1, were obtained by adding any bonuses or additional income reported by respondents to their reported gross salaries.

Table 2 shows slight increases in the number of respondents receiving medical insurance, life insurance, and dental insurance. However, there were also significant decreases in some areas that had experienced increases in the past few years: retirement pension plan (-2%), stock option plan (-4%), profit sharing (-4%), and travel budget (-3%).

Table 3, comparing income and principal work function, shows that the highest median salary ($75,000) belongs to those in administration. Consulting was close behind with $73,000. Again, the small response from academia means those salaries should not be considered statistically significant.

Those at the corporate management supervisory level (Table 4) had the highest median income ($102,000).

Table 5 compares income and the various regions surveyed. Overall, U.S. respondents make about $5,000 more than their Canadian counterparts (Note: Canadian respondents were asked to convert their salary to U.S. dollars). In the four major U.S. regions, the South had the highest median income ($61,000) and the Midwest had the lowest ($55,000).

Figure 1 compares income and the type of wood/pulp/paper company for respondents. Swings in the chemical byproducts category are not statistically significant due to a small number of responses. Most of the categories posted a gain, except for R&D and wood products. As expected, for those in management positions, income increases with the number of years of management experience up to a point at around 25 years of experience, where salaries flatten out (Figure 2). ■

TABLE 5: **Income and geographic location.**

Region	Lower decile	Lower quartile	Median	Upper quartile	Upper decile
U.S.	39	48	60	75	97
South	39	49	61	77	97
Northwest	42	51	60	76	92
Northeast	37	44	56	70	90
Midwest	38	45	55	70	96
Canada	35	45	55	68	85

Note: Canadian respondents were asked to convert their salaries to U.S. dollars.

FIGURE 1: **Income and type of wood/pulp/paper company (all respondents).**

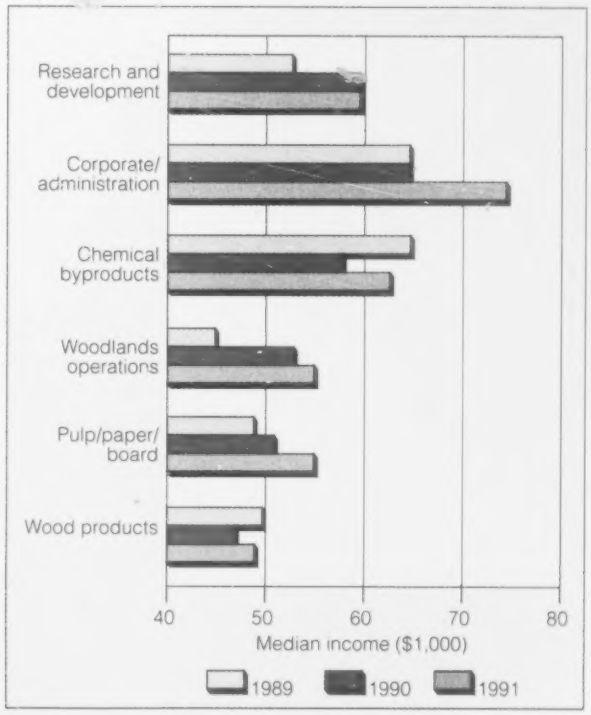


FIGURE 2: **Income and number of years of management experience.**